Thyroid Activity

Understanding Thyroid Activity

The pituitary gland at the base of the brain controls hormone production in your body. It makes thyroid-stimulating hormone (TSH), which tells the thyroid gland how much T4 and T3 to produce. The TSH level in your blood reveals how much T4 your pituitary gland is asking your thyroid gland to make. If your TSH levels are abnormally high, it could mean you have an underactive thyroid, or hypothyroidism. That's because it indicates your pituitary gland is producing more TSH in an effort to stimulate your thyroid to produce thyroid hormone, according to the Mayo Clinic.

Hair analysis results may often reveal additional and different information about thyroid activity than a blood test. Most confusion arises because blood thyroid tests do not reveal much about thyroid physiology. They usually only measure circulating hormones (T3 and T4) and pituitary stimulation of the thyroid (TSH).

Thyroid Physiology

Thyroid metabolism involves four important stages:

1. ***Hormone Production.*** To produce thyroxine (T4) requires manganese, iodine, tyrosine, cyclic AMP, vitamin C, B-complex and other micronutrients.Radiation toxicity, excessive oxidant stress, or toxic chemicals can block hormone synthesis. Mercury and copper toxicity stimulate hormone synthesis.
2. ***Hormone Release.*** Secretion of thyroid hormones requires *sympathetic nervous stimulation.* Many people have exhausted adrenal glands or other autonomic imbalances that may affect the sympathetic nervous system.
3. ***Absorption into the Cells.*** Once released into the blood, T4 must be absorbed into the body cells. For this to occur, the cell membranes must function properly. Accumulation of biounavailable calcium and magnesium excessively stabilize cell membranes and reduce cell permeability. Deficient calcium and magnesium cause excessive cell permeability. Oxidant stress or impaired fatty acid metabolism or other damage to cell membranes can also block absorption of thyroxine.Copper affects absorption by altering calcium and potassium levels. Cadmium or nickel toxicity affect hormone absorption by affecting the levels of calcium, sodium and other critical minerals.
4. ***Utilization in the Mitochondria.*** Once inside the cells, thyroxine must be converted to T3 and utilized in the mitochondria. Potassium plays a role in sensitizing the mitochondria to thyroid hormone.

Fluorides in drinking water and *chlorides* found in bleaches used to make white flour are powerful inhibitors of thyroid hormone utilization. They interfere with iodine metabolism. Substances in soy and in raw cabbage, cauliflower and broccoli also inhibit thyroid hormone utilization.

Foods that are most detrimental for one's thyroid are soy products and foods made with white flour. Many packaged foods processed with water contain high levels of fluorides that have found their way into water supplies.

Cells must also be able to respond to thyroid hormone stimulation. A range of vitamins and minerals are required for energy production in the glycolysis and carboxylic acid cycles in the mitochondria. If these co-factors are missing or toxins block steps in the pathway, thyroid hormone will be ineffective in increasing energy production.

Thyroid Problems

Imbalances can occur at any stage of the production or utilization of thyroid hormone. The concepts of hypothyroidism and hyperthyroidism are incomplete and often misleading as they only relate to hormone production and release.

- One person might have inadequate hormone production due to radiation damage.
- Another produces enough hormones, but has an autonomic imbalance preventing its release.
- Another cannot transport enough hormones into the cells due to low cell permeability.
- Another might have adequate hormone production but be unable to utilize the hormones in the cells due to a manganese deficiency or fluoride toxicity.
- Another may have excess hormone production due to copper or mercury toxicity and at the same time have inadequate cell permeability, causing a mixture of hypothyroid and hyperthyroid symptoms.

Blood tests do not assess these factors. As a result, they miss many problems, or may indicate a problem where none exists, or may indicate one imbalance when the opposite condition exists at the cellular level.

Most commonly, serum thyroid tests are normal but a thyroid imbalance is present. This may occur because the normal ranges of the blood tests are too wide. A normal range for TSH in most laboratories is 0.4 milliunits per liter (mU/L) to 4.0 mU/L. TSH should not be above 3.5 milliunits per liter (mU/L), yet many doctors still use 5 mU/L as the upper limit of normal. Additionally the blood tests cannot detect deficiencies and toxins affecting thyroid activity.

The most common imbalances are low thyroid effect due to impaired cell permeability in slow metabolizers and hyperthyroid symptoms due to copper or mercury toxicity of the thyroid gland. These commonly occur together causing a mixture of symptoms.

Hair Analysis For Thyroid Assessment

Hair analysis is excellent to help assess thyroid difficulties. It can indicate imbalances in many steps involved in thyroid hormone metabolism:

- ***The hair calcium level is an approximate thyroid effect indicator*** because thyroid hormone lowers calcium in the body. The higher the level of hair calcium, in general, the lower the effective activity of the thyroid gland.
- ***The potassium level is associated with sensitivity of the tissues to thyroid hormone.*** Low hair potassium is associated with reduced sensitivity of the mitochondrial receptors to thyroid hormone. Even if circulating hormone levels are normal and hormones can be absorbed into the cells, when tissue potassium is low they may not be utilized, resulting in a low thyroid effect. This commonly contributes to thyroid problems in slow metabolizers. Potassium supplements rarely help because the problem is a loss of potassium due to kidney dysfunction and electrical imbalances at the cellular level.
- ***Manganese deficiency can reduce thyroid activity.*** Manganese is required for T4 production. Manganese deficiency or biounavailability are very common today. A manganese deficiency is associated with a low hair manganese level. A high hair manganese level often indicates biounavailability. Adrenal exhaustion causes manganese to become biounavailable as the binding protein, transmanganin (manganese carrying protein in human plasma), is not produced in sufficient quantity.
- ***Metabolic typing can assess vitamin needs.*** Vitamins C and B-complex, for instance, tend to enhance thyroid activity. Higher doses are given to slow metabolizers and less to fast metabolizers to help balance thyroid activity. Supplementation without testing for the metabolic type is often ineffective or can aggravate thyroid imbalances.
- ***Hair calcium and magnesium levels are associated with cell permeability.*** Biounavailable calcium and magnesium stabilize cell membranes. This causes reduced cell membrane permeability that decreases thyroid hormone uptake into the cells. This produces a cellular thyroid hormone deficiency. Serum hormone levels may be normal or even elevated. High hair calcium and magnesium levels indicate some degree of biounavailable calcium and magnesium. This occurs mainly in slow metabolizers. Since serum hormone levels are normal or elevated, physicians may not give thyroid support when it is in fact needed.

The opposite may also occur. When tissue calcium and magnesium are low, as in fast metabolizers, cell membranes are more permeable. This causes more rapid uptake of thyroid hormone into the cells and an increased thyroid effect. Serum thyroid hormone levels may be normal or even decreased. A physician who only measures serum hormone levels (T3 and T4) or TSH might conclude that the patient needs a thyroid hormone. This will make the patient's condition much worse, although it may provide a temporary energy boost.

- ***Copper is an important thyroid indicator.*** The key here is that one cannot use the hair copper level as the only copper indicator because copper often does not accumulate in the hair, but rather in the brain, liver and other organs. One must not supplement copper simply on the basis of the hair copper level. Other test numbers, however, offer excellent information about copper status:

1. *Copper raises calcium and lowers potassium.* Elevated calcium and low potassium is a slow metabolizer pattern associated with the presence of excess tissue copper. It does not matter if the hair copper is low, normal or high. The pattern is associated with reduced thyroid utilization and hypothyroidism.
2. *Compensatory effects may occur.* Copper stimulates the production of biogenic amines – epinephrine, norepinephrine and dopamine. These can cause anxiety, sweating and other symptoms similar to hyperthyroidism.The body may compensate for the inhibitory effect of high calcium and low potassium by increasing T3 and T4 to force more thyroid hormone into the cells. TSH may vary. The symptoms and blood tests cause some physicians to diagnose hyperthyroidism. Irradiation or even surgery may be recommended when the real problem is copper imbalance. This commonly occurs.
3. *Weak adrenal glands cause copper to become biounavailable.* This produces another mixed picture. Often this is indicated by a low sodium/potassium ratio, or a low hair copper level. In these cases, even if hair copper is high, one must give some copper to relieve symptoms until copper becomes biologically available.
4. *Fast metabolizers are copper deficient.* They have a relatively low hair calcium level and elevated hair potassium. Their cells are excessively permeable and sensitive to thyroid hormone. Fast metabolizers all require copper supplements even if their hair copper level is normal or elevated.

- ***Other Toxic Metals and Imbalances.*** Energy production requires many nutrients and can be blocked by toxic chemicals and heavy metals. Hair analysis may provide indicators of an impaired energy such as cadmium toxicity or zinc deficiency that causes thyroid hormone to be ineffective in stimulating energy production.
- ***Autonomic Balance.*** Most slow metabolizers have depleted their sympathetic nervous systems and are in a pathological parasympathetic state. This can affect thyroid hormone release.